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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.
09/295,607	04/22/99	YAMAZAKI S	0756-1961

EXAMINER	
LOKE, S	
ART UNIT	**PAPER NUMBER**
2811	

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MMC1/0316

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Please find below and/or attached an Office communication concerning this application or proceeding.

Commissioner of Patents and Trademarks

Office Action Summary

Application No.	Applicant(s)
09/295,607	Yamazaki et al.
Examiner	**Group Art Unit**
Loke	2811

☒ Responsive to communication(s) filed on *Jan 2, 2001*.

☒ This action is **FINAL.**

☐ Since this application is in condition for allowance except for formal matters, **prosecution as to the merits is closed** in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11; 453 O.G. 213.

A shortened statutory period for response to this action is set to expire *3* month(s), or thirty days, whichever is longer, from the mailing date of this communication. Failure to respond within the period for response will cause the application to become abandoned. (35 U.S.C. § 133). Extensions of time may be obtained under the provisions of 37 CFR 1.136(a).

Disposition of Claims

☒ Claim(s) *2, 3, 6-8, 11, 12, 15-17, 19-35, and 37-59* is/are pending in the application.

Of the above, claim(s) _____ is/are withdrawn from consideration.

☐ Claim(s) _____ is/are allowed.

☒ Claim(s) *2, 3, 6-8, 11, 12, 15-17, 19-35, and 37-59* is/are rejected.

☐ Claim(s) _____ is/are objected to.

☐ Claims _____ are subject to restriction or election requirement.

Application Papers

☐ See the attached Notice of Draftsperson's Patent Drawing Review, PTO-948.

☐ The drawing(s) filed on _____ is/are objected to by the Examiner.

☐ The proposed drawing correction, filed on _____ is ☐approved ☐disapproved.

☐ The specification is objected to by the Examiner.

☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. § 119

☐ Acknowledgement is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d).

☐ All ☐ Some* ☐ None of the CERTIFIED copies of the priority documents have been

☐ received.

☐ received in Application No. (Series Code/Serial Number) _____.

☐ received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

*Certified copies not received: _____.

☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).

Attachment(s)

☒ Notice of References Cited, PTO-892

☒ Information Disclosure Statement(s), PTO-1449, Paper No(s). *20, 22-23*

☐ Interview Summary, PTO-413

☐ Notice of Draftsperson's Patent Drawing Review, PTO-948

☐ Notice of Informal Patent Application, PTO-152

--- SEE OFFICE ACTION ON THE FOLLOWING PAGES ---

1. Claims 46 and 54-59 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In claim 46, line 2, "an insulating film" is unclear whether it is different from the insulation film of claim 7, line 3.

In claim 54, lines 9-10, claim 57, lines 9-10, "said thin film transistor" has no antecedent basis.

2. Claims 31-35 and 37-42 are rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

The specification discloses the aluminum nitride film has a thickness from 100 to 5000 angstroms. The specification never discloses the aluminum nitride insulating film has a thickness of all the values of 5000 angstroms or less as claimed in claims 31-35 and 37-42.

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 7, 16, 34 and 46 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mano et al. in view of Ikeda (Japanese patent 59-121876 in PTO-1449).

Mano et al. discloses an active matrix liquid crystal display device in fig. 7. It comprises a polycrystalline silicon thin film transistor formed on a quartz substrate [408].

Mano et al. differs from the claimed invention by not showing an AlN layer formed under the rear surface of the substrate.

Ikeda shows an AlN layer [12] formed under the rear surface of a glass substrate [11] in fig. 1(c).

Since both Mano et al. and Ikeda teach a thin film transistor formed on a glass substrate, it would have been obvious to have the AlN layer of Ikeda in Mano et al. because it prevents a thin film device from deforming at the time of forming the device.

It is well known in the semiconductor art that aluminum nitride has a thermal conductivity of 0.6 W/cm K or higher.

In regards to claim 46, the process limitation of how the channel formation region is formed has no patentable weight in claim drawn to structure. It is important to note that there are many ways to form the channel formation region. Therefore, the phrase "crystallized by laser irradiation through an insulating film" is thus non-limiting.

5. Claims 3, 8, 12, 17, 20, 22-24, 26, 28-30, 32, 35, 38, 40-42, 44, 47, 49 and 51-53 are rejected under 35 U.S.C. 103(a) as being unpatentable over Troxell et al. in view of Ikeda (Japanese patent 59-121876 in PTO-1449), further in view of Yamazaki et al. (Japanese patent no. 62-112128).

Troxell et al. discloses a semiconductor device in fig. 1. It comprises: a polycrystalline silicon thin film transistor formed on a glass substrate [10]; a silicon nitride layer [14] and a silicon dioxide layer [16] formed on the top surface of the glass substrate [10] and a silicon nitride layer [12] formed on the bottom surface of the glass substrate [10].

Troxell et al. differs from the claimed invention by not showing an AlN layer formed on the rear surface and the top surface of the substrate.

Ikeda shows an AlN layer [12] formed on the rear surface and the top surface of a glass substrate [11] in fig. 1(c).

Since both Troxell et al. and Ikeda teach an insulating layer formed on a glass substrate, it would have been obvious to have the AlN layer of Ikeda in Troxell et al. because it prevents a thin film device from deforming at the time of forming the device.

Ikeda differs from the claimed invention by not having at least one of boron, silicon, carbon, and oxygen in the AlN film.

Yamazaki et al. shows a nitride coating [3, 3'] made of a mixture of AlN, SiN and BN can be used as blocking layer for alkali metal in LCD device.

Since both Ikeda and Yamazaki et al. teach an AlN layer formed on a glass substrate, it would have been obvious to have the nitride of Yamazaki et al. in Ikeda because it prevents alkali metal ions diffuse into the display device.

In regards to claims 3, 20, it is well known in the semiconductor art that aluminum nitride has a thermal conductivity of 0.6 W/cm K or higher.

In regards to claim 8, it would have been obvious for the device is an active matrix type display because it is a well known liquid crystal display format.

In regards to claims 22-24, Ikeda shows the insulating AlN layer [12] has an aluminum to nitrogen ratio of 1.0.

In regards to claims 44, 47, 49, 51-53, the process limitation of how the channel formation region is formed has no patentable weight in claim drawn to structure. It is important to note that there are many ways to form the channel formation region. Therefore, the phrase "crystallized by laser irradiation through an insulating film" is thus non-limiting.

6. Claims 2, 3, 7, 8, 11, 12, 16, 17, 19, 20, 22-26, 28-32, 34, 35, 37, 38, 40-44, 46-49 and 51-53 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 15-26 of U.S. Patent No. 5,583,369 (Yamazaki et al.) in view of Troxell et al.

Yamazaki et al. discloses a SOI device in fig. 12(E). It comprises: an AlN layer [1102] containing at least one of boron, silicon, carbon and oxygen formed on a top surface and a bottom surface of a glass substrate [1101]; an oxide layer [1103] formed on the AlN layer [1102]; an insulated gate field effect transistor formed on the substrate.

Yamazaki et al. differs from the claimed invention by not showing the channel region comprising crystalline silicon.

Troxell et al. discloses a semiconductor device in fig. 1. It comprises: a polycrystalline silicon thin film transistor formed on a glass substrate [10].

Since both Yamazaki et al. and Troxell et al. teach an insulated gate field effect transistor formed on a glass substrate, it would have been obvious to have the transistor of Troxell et al. in Yamazaki et al. because it is a widely used thin film transistor structure.

In regards to claims 3, 7, 20, it is well known in the semiconductor art that aluminum nitride has a thermal conductivity of 0.6 W/cm K or higher.

In regards to claims 7-9, it would have been obvious for the device is an active matrix type display because it is a well known liquid crystal display format.

In regards to claims 22-24, Ikeda shows the insulating AlN layer [12] has an aluminum to nitrogen ratio of 1.0.

In regards to claims 43, 44, 46-49, 51-53, the process limitation of how the channel formation region is formed has no patentable weight in claim drawn to structure. It is important to note that there are many ways to form the channel formation region. Therefore, the phrase "crystallized by laser irradiation through an insulating film" is thus non-limiting.

7. Claims 6, 15, 21, 27, 33, 39, 45 and 50 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 15-26 of U.S. Patent No. 5,583,369 (Yamazaki et al.) in view of Mano et al.

Yamazaki et al. discloses a SOI device in fig. 12(E). It comprises: an AlN layer [1102] containing at least one of boron, silicon, carbon and oxygen formed on a top surface and a bottom surface of a glass substrate [1101]; an oxide layer [1103] formed on the AlN layer [1102]; an insulated gate field effect transistor formed on the substrate.

Yamazaki et al. differs from the claimed invention by not showing the channel region comprising crystalline silicon.

Mano et al. discloses a semiconductor device in fig. 7. It comprises: a polycrystalline silicon thin film transistor formed on a quartz substrate [408].

Since both Yamazaki et al. and Mano et al. teach an insulated gate field effect transistor formed on a substrate, it would have been obvious to have the transistor of Mano et al. in Yamazaki et al. because it is a widely used thin film transistor structure.

In regards to claims 45, 50, the process limitation of how the channel formation region is formed has no patentable weight in claim drawn to structure. It is important to note that there are many ways to form the channel formation region. Therefore, the phrase "crystallized by laser irradiation through an insulating film" is thus non-limiting.

8. Claims 54-59 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 15-26 of U.S. Patent No. 5,583,369 (Yamazaki et al.) in view of Shimada et al.

Yamazaki et al. discloses a SOI device in fig. 12(E). It comprises: an AlN layer [1102] containing at least one of boron, silicon, carbon and oxygen formed on a top surface and a bottom surface of a glass substrate [1101]; an oxide layer [1103] formed on the AlN layer [1102]; an insulated gate field effect transistor formed on the substrate.

Yamazaki et al. differs from the claimed invention by not showing the channel region comprising crystalline silicon, and an interlayer insulating film having a leveled upper surface over the transistor and a pixel electrode over the interlayer insulating film.

Shimada et al. discloses a semiconductor device in figs. 1-3. It comprises: a polycrystalline silicon thin film transistor formed on a glass substrate [11]; the thin film transistor having a channel formation region comprising crystalline silicon, a gate insulating film [13] adjacent to the channel formation region, and a gate electrode [3a] adjacent to the channel formation region with the gate insulating film interposed therebetween; an interlayer insulating film [17] having a leveled upper surface over the transistor; a pixel electrode [4] over the interlayer insulating film [17].

Since both Yamazaki et al. and Shimada et al. teach an insulated gate field effect transistor formed on a substrate, it would have been obvious to have the transistor of Shimada et al. in Yamazaki et al. because it is a widely used thin film transistor structure. It would also have been obvious to have the interlayer insulating film and the pixel electrode of Shimada et al. in Yamazaki et al. because the interlayer insulating film can protect the transistor and the pixel electrode can provide an image from the transistor.

In regards to claims 55, 58, the process limitation of how the channel formation region is formed has no patentable weight in claim drawn to structure. It is important to note that there are many ways to form the channel formation region. Therefore, the phrase "crystallized by laser irradiation through an insulating film" is thus non-limiting.

9. Applicant's arguments filed ½/01 have been fully considered but they are not persuasive.

It is urged, in page 4 of the remarks, that the specification discloses that the aluminum nitride film is preferably deposited at a thickness from 100 to 5000 angstroms. However, the specification never discloses the thickness of the aluminum nitride film is between 0 to 100 angstroms. The specification never discloses the claimed subject matters as claimed in claims 31-35 and 37-42.

It is urged, in page 4 of the remarks, that the Office Actions fails to provide a single reference to support the contention that it is well known in the semiconductor art that aluminum nitride has a thermal conductivity of 0.6 W/cmK or higher. As shown in the U.S. patent issued to Kim et al. (filed on 12/20/91), the patent shows the thermal conductivity of aluminum nitride (AlN) is 1.5 W/cmK (Table 1, column 1, lines 25-35). Therefore, it is well known in the semiconductor art that aluminum nitride has a thermal conductivity of 0.6 W/cmK or higher.

It is also urged, in page 4 of the remarks, that Ikeda never shows the insulating AlN layer has an aluminum to nitrogen ratio of 1.0. However, as shown in the English translation of Ikeda (submitted by the applicants on 2/6/2001), the chemical formula of aluminum nitride is AlN. From this formula, one of ordinary skills in the art would know the aluminum to nitrogen ratio is 1.0. Ikeda meets the limitation of the claimed invention.

It is urged, in page 5 of the remarks, that none of the reference suggest the aluminum nitride film has a thickness of 5000 angstroms or less. However, the English translation of Ikeda (page 1, claim 5, page 4, lines 24-27) shows the AlN can have a thickness of hundreds of

angstroms to 1 micron or 0.5 micron (5000 angstroms) to 10 microns. Therefore, Ikeda meets the limitation of the claimed invention.

10. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Steven Loke whose telephone number is (703) 308-4920.

sl

March 14, 2001

Steven Loke
Primary Examiner